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Students' Perceptions and Readiness in Bilingual Learning: A Case Study in General Chemistry 1 Course

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Abstract

The development of bilingual education in the Chemistry course involves the integration of two languages, typically the local language and English, as the medium of instruction. This article explores students' perceptions and readiness toward bilingual education in the context of the General Chemistry 1 course. Survey 1 indicated that most students had negative attitudes towards bilingual education, considering English as just another subject rather than a language to learn. Survey 2 showed a shift in students' perceptions after experiencing bilingual learning, with many acknowledging the benefits of learning in both languages. While 66.7% initially disagreed with bilingual education, 50% of them found it helpful for learning English and other subjects. The study highlights the need to introduce English lectures gradually and adopt appropriate teaching methods to ensure effective learning. However, instructors face challenges, such as students' weak English foundation and decreased interest in learning. Strategies proposed to address these issues include encouraging active student participation and cultivating high-quality interdisciplinary talents. Moreover, lecturers are urged to continuously improve their language and teaching skills, adopting modern educational ideas, and fostering innovative teaching methods. Colleges and universities are encouraged to embrace the opportunities of internationalization and strengthen the construction of bilingual courses and modern education platforms, ultimately cultivating bilingual teachers with enthusiasm. The goal of bilingual teaching is to develop bilingual talent, necessitating instructors to engage in constant learning and introduce new teaching methods to cultivate students' bilingual thinking mode.

Keywords: Bilingual education, chemistry, perceptions and readiness.

INTRODUCTION

In today's interconnected and multicultural world, the demand for bilingual education has gained significant attention in various academic disciplines. One such area where bilingual education has shown promising outcomes is the field of chemistry. By incorporating bilingual instruction in chemistry courses, educational institutions can bridge the language gap and enhance students' understanding of complex scientific concepts. Bilingual education in chemistry entails utilizing both the student's native language, Bahasa Indonesia, and the language of instruction, English, to facilitate comprehension and foster a deeper understanding of chemistry concepts. By employing this approach, UT aims to empower students to overcome language barriers and strengthen their scientific literacy, thereby improving their academic success and future career prospects.

Tong and Shi (2012) investigated the current practices and challenges of Chinese-English bilingual education in Chinese tertiary institutions. The research also includes a case study of a specific bilingual course, focusing on learners' attitudes toward this educational and language policy. The students' positive attitudes toward bilingual instruction were found to significantly predict their academic achievement in the bilingual course. Surprisingly, the level of English proficiency did not have a significant impact on academic performance. The study found a positive relationship between the number of years students had been learning English and their attitudes toward bilingualism.

Dewi (2012) studied the positive attitudes of university staff and students in Indonesia toward the English language and its role in the country's multilingual context. The participants, representing staff and students from nine universities in Jogjakarta, did not view English as a manifestation of imperialism or a threat to national identity. Instead, they saw English as a valuable tool for social mobility and upward economic trajectory.

Yang (2013) implemented one year of bilingual education in Organic Chemistry at the Hebei University of Technology course where both Chinese and another language (possibly English) were used as mediums of instruction. The results demonstrated that students generally favored bilingual education in the Organic Chemistry course after experiencing it. This suggests that students perceived some benefits or positive aspects of the bilingual approach. Some students found the course difficult, indicating potential challenges with the bilingual education implementation. Additionally, the study revealed that there is a need to enhance the teaching content and methods to improve the overall effectiveness of the bilingual course.

The provided text (Mazak & Herbas-Donoso, 2015) introduces an ethnographic case study that aims to describe in detail the translanguaging practices of a professor in an undergraduate science course at an officially bilingual university. The study identifies and analyzes instances of translanguaging during the professor's instruction. These translanguaging practices refer to moments when both Spanish and English were used to present academic content to the students. The study reveals that translanguaging served to familiarize and mentor Spanish-dominant students in using English for scientific purposes. This approach aimed to support their development and engagement in the academic content presented in the English language. The documented translanguaging practices in this study can provide valuable insights and possibilities for other multilingual university classrooms worldwide.

An exploratory study conducted by (Archila & de Mejía, 2020) investigated bilingual science teaching practices (BTP) and beliefs of science professors in a Colombian university. The study was motivated by the increasing prevalence of bilingual practices in university science courses due to the internationalization of higher education. The results of the study indicated that a significant number of participants held positive beliefs about the importance of bilingualism and the role of English in undergraduate science courses for fostering an international academic perspective on science. However, despite these positive beliefs, the BTPs of the science professors were found to be limited. They were not effectively utilizing bilingualism to enhance undergraduate students' conceptual knowledge, bilingual language skills, and scientific abilities.

Zein (2019) said that multilingual education is seen as essential, recognizing English as a global language that offers opportunities for social and economic advancement. English is acknowledged as a vital language for global communication and mobility, equal attention is given to promoting Indonesian as the national language and preserving heritage and indigenous languages and cultures.

Sucitra (2020) conducted a study to exploring students' perceptions toward bilingual education in the International Class Program (ICP) for chemistry education. The research also investigates the benefits of using two languages (English and Indonesian) as instructions by the lecturer in the classroom. The study revealed that the students had positive perceptions toward the use of bilingual education in the ICP for chemistry education. This indicates that the students viewed the integration of both English and Indonesian languages as instructional mediums in a favorable light. The results indicated that bilingual education in the ICP helped students improve their English language skills. This suggests that learning chemistry in English supported students' efforts in gaining better control and proficiency in the English language. The study concludes that teaching chemistry in English facilitates students' attempts to learn and improve their English language proficiency. This finding implies that the use of English as a medium of instruction in chemistry courses within the ICP setting positively impacts students' language learning endeavors.

A research study conducted by (Endrayanto, 2021) at the Study Program of English, Faculty of Cultural Studies, Universitas Brawijaya in Indonesia focuses on exploring the perceptions of both lecturers and students regarding the English instruction provided in the international class program at the university. The results of the survey revealed that the participating students expressed high levels of satisfaction with the international class program. Furthermore, they showed a preference for a monolingual approach to English instruction rather than a bilingual one. This suggests that the students favored having English as the sole medium of instruction in the L2 (second language) classroom, without the use of their native language as support or reference.

Vukadinova et al. (2021) studied the benefits of using bilingual learning materials in education. Bilingual learning materials refer to educational resources that are presented in two languages, allowing students to engage with the content using both languages. The result showed the advantages of using bilingual learning materials in education. These materials promote an effective learning approach, support students in establishing connections between concepts, and enhance their ability to recall and apply knowledge. Bilingual resources also lead to a better understanding of course content, increased motivation, and improved readiness for future professional responsibilities. Overall, the

utilization of bilingual materials can significantly benefit students' learning experiences and skill development.

Archila et al. (2022) conducted a study focused on the rise of university bilingual science courses due to the internationalization of higher education. The study particularly explores the concept of Bilingual Argument Mapping (BAM), which refers to the ability to construct argument maps using two languages. An argument map is a visual representation of the structure of an argument. However, little is known about how to foster BAM in these bilingual science courses. The main goal of the study is to investigate the potential use of Formal and Informal Formative Assessment (FIFA) to support undergraduates' development of BAM. FIFA is a type of assessment that involves providing feedback to students, which is both preplanned and instantaneous, aiming to enhance their learning. The study revealed that the implementation of FIFA positively influenced the participants' ability to create valid and coherent argument maps in both Spanish and English. Additionally, a hybrid version using code-switching (switching between languages) was employed by some students in their responses.

Although many researchers have explored bilingual education over the years, this style of teaching is still a growing practice in Indonesia. Bilingualism in Indonesia is even more necessary to find suitable bilingual teaching methods in different subjects. On the other hand, bilingual education is a trend in higher education. Therefore, bilingual education in the General Chemistry 1 course will be implemented at the Universitas Terbuka in one session.

The objectives of this study are to explore students' perceptions and readiness regarding bilingual education in chemistry. This research endeavor holds significant implications for both chemistry education and language instruction in Indonesia. By shedding light on the effectiveness of bilingual education in the context of chemistry courses, it will contribute to the development of evidence-based pedagogical practices that can be adopted by other educational institutions. Furthermore, it will provide valuable insights into the unique challenges and opportunities associated with bilingual education in a distance learning setting like Universitas Terbuka.

This article focuses on the implementation of bilingual education in the General Chemistry 1 course at Universitas Terbuka (UT), a prominent open and distance learning institution in Indonesia. UT's commitment to providing accessible and inclusive education makes it an ideal setting to explore the potential benefits of bilingual instruction in chemistry.

METHODS

A survey (survey 1) was conducted to explore students' perceptions of bilingual education in the General Chemistry 1 course. The survey aimed to understand students' attitudes toward bilingual education and their concerns regarding the use of English in their studies. The survey involved 48 Universitas Terbuka students from different majors and their English proficiency levels varied. The questionnaire and anonymous answers were all in Bahasa Indonesia.

Teaching one of eight sessions of the online tutorial of the General Chemistry 1 course was laid down. Session 6 titled "The Chemical Bond" was chosen as a bilingual course. Lectures will be introduced in Bahasa Indonesia and English in the same portion. There will be translation course material in English after written in Bahasa Indonesia. The teaching arrangement involves the delivery of lectures, teaching materials, and

enrichment videos in Indonesian and subtitles in English. Furthermore, students were asked to answer the discussion and were given directions to answer in both languages. After lectures in 2 languages, students were asked to fill out a survey (survey 2) to find out the impression they got after carrying out lectures in 2 languages.

RESULTS AND DISCUSSION

Students' Perceptions

Survey 1 revealed that 33.3% of the students desired bilingual education in the General Chemistry 1 course. Most students (66.7%) disagreed if learning English was applied in the General Chemistry 1 lecture. Overall, the attitudes toward bilingual education in General Chemistry 1 were predominantly negative.

Surveys showed that negative attitudes towards bilingual education can be attributed to English being seen as just another subject rather than a language to learn. The results suggest that English lectures should be introduced gradually, and instructors should adopt appropriate teaching methods to ensure effective learning.

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Students' Readiness

Survey 2 shows that the opinion that bilingual education is not difficult is 25% while the same percentage is obtained, namely 18.8% for the opinion that learning bilingual is difficult, not as difficult as imagined, and good for students.

Surveys 1 and 2 were compared to find out how the students' perceptions were before and after doing bilingual learning. There was a change in students' perceptions, namely most students (66.7%) said they did not agree if bilingual learning was implemented, but 50% of them said that bilingual learning helped them to learn English. 50% of them also said that the bilingual learning that had been implemented in session 6 of Basic Chemistry 1 would help them in other subjects and somewhat agreed that learning in English specifically in chemistry was useful for them. As many as 37.5% of students said that bilingual learning would not be detrimental to learning Basic Chemistry 1 while 12.5% said different things followed by 25% of students who somewhat agreed that bilingual learning would be detrimental to learning, the remaining 25% said somewhat disagreed if bilingual learning was said to be detrimental to learning. As much as 56.3% of students agree that bilingual learning can help them understand Basic Chemistry 1 lectures in depth and 62.5% also say that bilingual learning helps them understand more in-depth knowledge. More than 80 percent of students said they felt more competitive than before. In general, 62.5% of students are satisfied with bilingual learning.

We found it interesting that there was a change in attitude towards bilingual learning before and after bilingual learning was implemented in session 6 of the Elementary Chemistry 1 lecture. They applauded the course, but they did not make enough effort because 44.4% gave answers in Bahasa English while the rest answered in Indonesian.

However, as instructors, we have to rethink whether our way of teaching is right for them. Can we revise the teaching content to attract their attention to get a better

teaching effect? How can we assist students in finding suitable learning methods? Further studies should be conducted on this topic (Yang, 2013).

We still find that we face the same problems in bilingual teaching, such as students' weak foundation in English, decreased interest in learning, and out-of-date teaching methods and textbooks (Li et al., 2021). Li et al. (2021) proposed several strategies to deal with these challenges, including students having to adapt to social development trends, actively participate in bilingual course studies, and strive to become high-quality interdisciplinary talents.

Lecturers must also study modern educational ideas, optimize teaching skills, adopt modern teaching technologies, stimulate student enthusiasm, and cultivate student initiative. Colleges and universities should seize this opportunity to keep up with the pace of internationalization of higher education, strengthen the construction of bilingual courses and modern education platforms, and cultivate bilingual teachers with enthusiasm.

The goal of bilingual teaching is to cultivate bilingual talent, so teachers must have the ability to constantly engage in new knowledge and try to introduce new methods into the classroom so lecturers must have a strong background in professional knowledge and a deep-thought understanding of the latest academic limitations. In addition, lecturers must have a high level of English and Standard English pronunciation. Lecturers who apply bilingual learning must be able to develop their own mode of thinking in English by attending a lot of training, reading frequently, and attending English courses from foreign universities, etc. in order to cultivate students who have a 'bilingual thinking mode'. This is able to significantly improve the quality of the teacher itself as a whole. In addition, lecturers need to cultivate innovation in innovative teaching modes, explore the attractiveness of their own teaching, make clear explanations on topics, activate the learning atmosphere by asking some interesting questions, etc. Efforts that need to be made by lecturers are broadening students' insights, and stimulating student enthusiasm; hence, beneficial outcomes are believed to emerge during curriculum teaching (Mu et al., 2019).

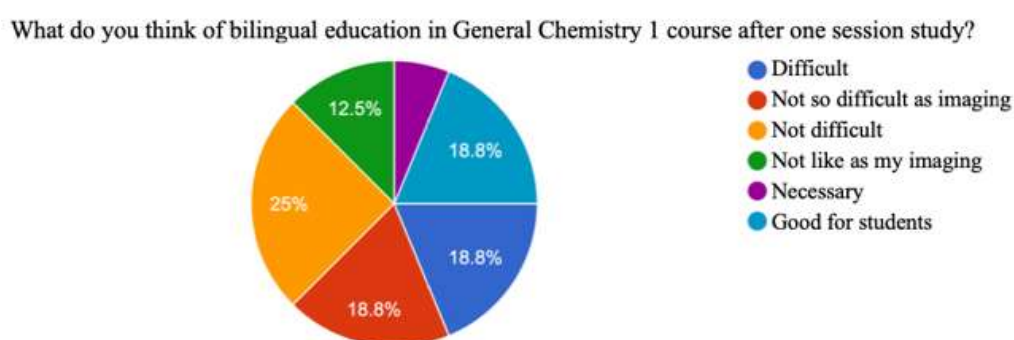


Figure 1. Result of questionnaire 2 of part A.

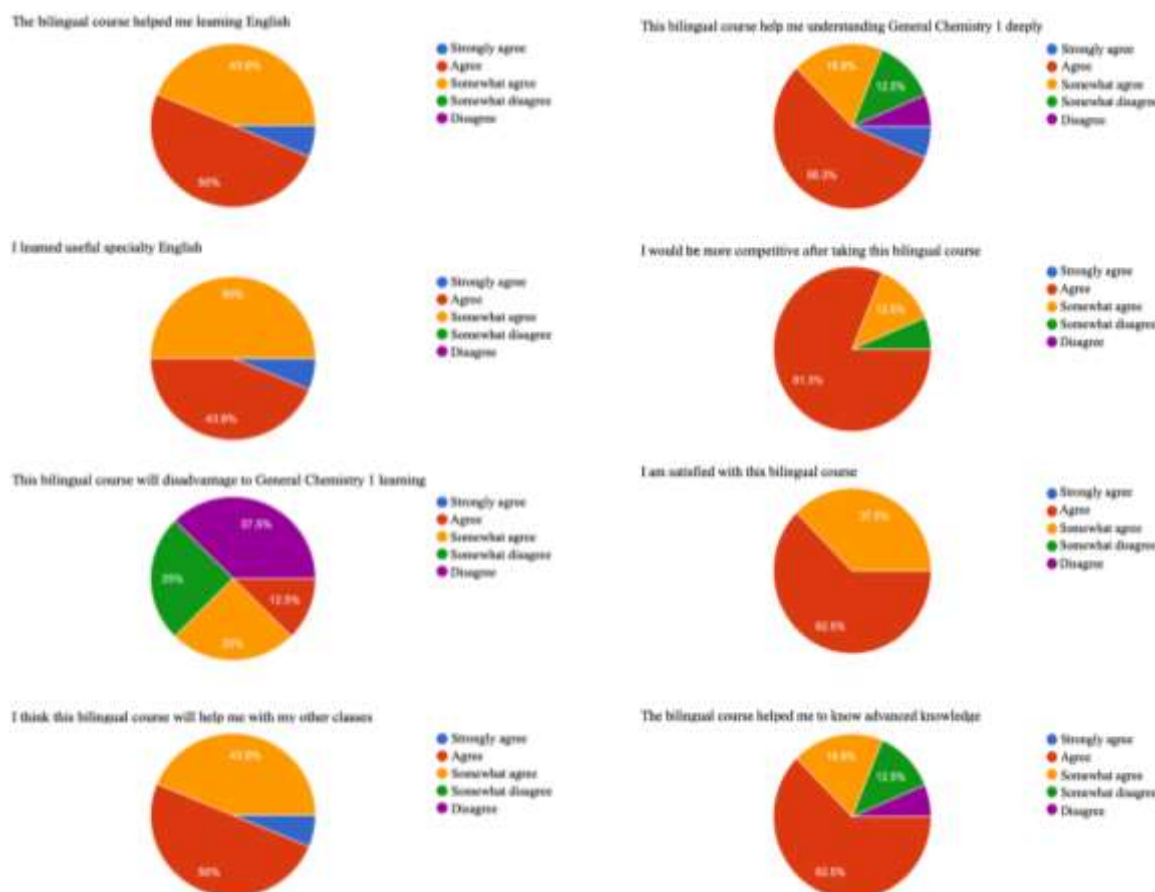


Figure 2. Result of questionnaire 2 of part B.

CONCLUSION

In conclusion, the findings from the surveys regarding students' perceptions and readiness towards bilingual education in the General Chemistry 1 course have provided valuable insights. Most students initially held negative attitudes towards bilingual education, perceiving English as just another subject rather than a language to learn. However, after experiencing bilingual learning, there was a noticeable shift in their perceptions. A significant number of students recognized the benefits of bilingual education, acknowledging its contribution to learning English and enhancing their understanding of the subject matter. Despite this positive change, there are still challenges to address, including students' weak foundation in English, decreased interest in learning, and outdated teaching methods and materials. To overcome these obstacles, instructors should gradually introduce English lectures and adopt appropriate teaching methods to ensure effective learning. Moreover, it is crucial for instructors to continuously develop their own language and teaching skills, embracing modern educational ideas, and fostering a dynamic and engaging learning atmosphere. The goal of bilingual teaching is to cultivate bilingual talents, and this requires a concerted effort from both educators and institutions. By seizing the opportunity of internationalization in higher education, colleges, and universities can strengthen the construction of bilingual courses and modern education platforms, providing students with the necessary tools to succeed in an increasingly interconnected world. Further research is recommended to explore how to optimize teaching content and learning methods to

cater to students' needs and preferences effectively. Overall, embracing multilingualism and adopting innovative teaching strategies will contribute to a more inclusive and successful bilingual education experience for students.

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